

Appl. No.: 10/039,728
Amendment dated January 3, 2005
Reply to Office Action of October 1, 2004

Amendments to the Claims:

1. (Currently Amended) A method for treating a metal, comprising subjecting the metal to electrolysis in the presence of an electrolyte using alternating pulses of at least one of voltage and current, said alternating pulses being of opposite polarity, wherein if the electrolyte is an aqueous electrolyte it is an aqueous solution of a salt selected from the group consisting of alkali metal salts, alkali earth metal salts, aluminum salts and ammonium salts, said method modifying the metallic structure of the metal at and below the surface of the metal.
2. (Original) A method according to claim 1, wherein the metal is austenitic stainless steel.
3. (Previously Presented) A method according to claim 1, wherein the electrolyte contains nitrogen.
4. (Original) A method according to claim 3, wherein the electrolyte is an aqueous solution of a nitrogen-containing salt.
5. (Original) A method according to claim 4, wherein the electrolyte is an aqueous nitrite solution.
6. (Original) A method according to claim 5, wherein the electrolyte is aqueous sodium nitrite.
7. (Previously Presented) A method according to claim 1, wherein the alternating pulses have waveform selected from the group consisting of sinusoidal waveforms and square waveforms.
8. (Previously Presented) A method according to claim 1, which further comprises, after said step of subjecting the metal to electrolysis, heat treating the metal.

Appl. No.: 10/039,728
Amendment dated January 3, 2005
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9. (Previously Presented) A method according to claim 1, wherein the metal is in the form of a metal article or a part of a metal article for use in an environment in which it will be exposed to tribological activity.

10. (Previously Presented) A method according to claim 1, wherein the metal is for use as a moving part in an apparatus.

11. (Previously Presented) A method according to claim 1, said step of subjecting the metal to electrolysis being carried out *in situ* on apparatus selected from the group consisting of engineering equipment and storage tanks.

12. (Original) A metal or metal article which has been subjected to a method as defined in claim 1.

13. (Previously Presented) A method for improving the resistance of austenitic stainless steel to mechanical degradation, said method comprising subjecting said austenitic stainless steel to electrolysis in the presence of an electrolyte using alternating pulses of at least one of voltage and current, said alternating pulses being of opposite polarity, wherein if the electrolyte is an aqueous electrolyte it is an aqueous solution of a salt selected from the group consisting of alkali metal salts, alkali earth metal salts, aluminum salts and ammonium salts.

14. (Previously Presented) A method for removing martensite from or transforming martensite to austenitic stainless steel, said method comprising subjecting said stainless steel to electrolysis in the presence of an electrolyte using alternating pulses of at least one of voltage and current, said alternating pulses being of opposite polarity, wherein if the electrolyte is an aqueous electrolyte it is an aqueous solution of a salt selected from the group consisting of alkali metal salts, alkali earth metal salts, aluminum salts and ammonium salts.

Appl. No.: 10/039,728
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15. (Previously Added) A method according to claim 1, wherein the electrolyte is an aqueous electrolyte.

16. (Previously Added) A method according to claim 1, wherein the metal is steel.

17. (Currently Amended) A method according to claim 1, wherein the metal is titanium or a titanium alloy.

18. (New) A method according to claim 1, wherein said method includes a phase transformation or relaxation of stresses within the surface of the metal.